

WHAT IS CLAIMED IS:

1. An encoding apparatus for encoding frame data containing image data and sound data, comprising:

separating means for separating the image data
5 and sound data contained in the frame data;

image data encoding means for encoding the separated image data in sequence from a lower to a higher frequency component thereof, thereby generating image encoded data;

10 sound data encoding means for encoding the separated sound data in sequence from a lower to a higher frequency component thereof, thereby generating sound encoded data; and

frame encoded data generating means for
15 generating header information by using the image encoded data and the sound encoded data, and generating frame encoded data by using the header information, the image encoded data, and the sound encoded data.

2. The apparatus according to claim 1, wherein the
20 header information contains at least one of the size of the image data, image type information of the image data, the length of the image encoded data, the length of the sound encoded data, identification information of said encoding apparatus, the transmission date and
25 time, the start address of the image encoded data, and the start address of the sound encoded data.

3. The apparatus according to claim 1, wherein said

image data encoding means generates a transform
coefficient sequence for subbands by performing
discrete wavelet transform for the image data, groups
subbands of the same level, and sequentially encodes
5 the transform coefficient sequence from a lower- to a
higher-level subband, thereby generating the image
encoded data.

4. The apparatus according to claim 1, wherein said
sound data encoding means generates a transform
10 coefficient sequence for subbands by performing
discrete wavelet transform for the sound data, groups
subbands of the same level, and sequentially encodes
the transform coefficient sequence from a lower- to a
higher-level subband, thereby generating the sound
15 encoded data.

5. The apparatus according to claim 1, wherein said
frame encoded data generating means generates the frame
encoded data by arranging the header information, the
image encoded data, and the sound encoded data in the
20 order named.

6. The apparatus according to claim 1, wherein said
frame encoded data generating means generates the frame
encoded data by grouping subbands of the same level in
the image encoded data and the sound encoded data, and
25 arranging the groups in ascending order of level
following the header information.

7. The apparatus according to claim 1, wherein said

frame encoded data generating means generates the frame encoded data by using quasi-frame encoded data composed of a portion of the image encoded data and a portion of the sound encoded data.

- 5 8. An encoding apparatus for encoding frame data containing image data and sound data, comprising:

separating means for separating the image data and the sound data contained in the frame data;

- 10 image data encoding means for hierarchizing the image data into a plurality of types of image data and encoding the plurality of types of image data, thereby generating image encoded data corresponding to a plurality of levels;

- 15 sound data encoding means for hierarchizing the sound data into a plurality of types of sound data and encoding the plurality of types of sound data, thereby generating sound encoded data corresponding to a plurality of levels; and

- 20 frame encoded data generating means for generating frame encoded data by using the image encoded data and the sound encoded data,

- 25 wherein said frame encoded data generating means generates the frame encoded data by forming a plurality of groups of different levels by grouping the image encoded data and sound encoded data belonging to the same level determined on the basis of a predetermined reference, and arranging the plurality of groups in

descending order of significance level.

9. The apparatus according to claim 8, wherein the plurality of types of image data hierarchized by said image data encoding means correspond to a plurality of
5 frequency components obtained by discrete wavelet transform of the image data.

10. The apparatus according to claim 8, wherein the plurality of types of sound data hierarchized by said sound data encoding means correspond to speech data
10 which corresponds to a human voice and non-speech data other than the speech data.

11. The apparatus according to claim 10, wherein said frame encoded data generating means groups encoded data of the speech data as sound encoded data of significant
15 level together with first image encoded data, and groups encoded data of the non-speech data as sound encoded data of insignificant level together with second image encoded data.

12. The apparatus according to claim 11, wherein
20 the plurality of types of image data hierarchized by said image data encoding means contain a first frequency component obtained by discrete wavelet transform of the image data and a second frequency component higher than the first frequency component,
25 and

the first and second image encoded data correspond to the first and second frequency components,

respectively.

13. The apparatus according to claim 8, wherein the plurality of types of sound data hierarchized by said sound data encoding means correspond to speech data
5 which corresponds to a human voice and not less than two non-speech data obtained by hierarchizing non-speech data other than the speech data.

14. The apparatus according to claim 12, wherein said frame encoded data generating means

10 groups encoded data of the speech data as sound encoded data of most significant level together with the first image encoded data,

groups encoded data of first non-speech data obtained by hierarchizing the non-speech data, as sound
15 encoded data of level significant next to the most significant level, together with the second image encoded data, and

groups encoded data of second non-speech data other than the first non-speech data, obtained by
20 hierarchizing the non-speech data, together with third image encoded data.

15. The apparatus according to claim 14, wherein the plurality of types of image data hierarchized by said image data encoding means contain a first frequency
25 component obtained by discrete wavelet transform of the image data, a second frequency component higher than the first frequency component, and a third frequency

component higher than the second frequency component,
and

the first, second, and third image encoded data
correspond to the first, second, and third frequency
5 components, respectively.

16. The apparatus according to claim 8, wherein said
frame encoded data generating means groups the image
encoded data and the sound encoded data by selectively
using a plurality of types of grouping methods.

10 17. The apparatus according to claim 16, wherein the
plurality of types of grouping methods include a
grouping method which gives priority to image quality
and a grouping method which gives priority to sound
quality.

15 18. The apparatus according to claim 16, further
comprising:

transmitting means for transmitting the frame
encoded data;

20 detecting means for detecting a decoding status
of the transmitted frame encoded data; and

control means for switching the grouping methods
in accordance with the detected decoding status.

19. An encoding method of encoding frame data
containing image data and sound data, comprising:

25 the separating step of separating the image data
and the sound data contained in the frame data;

the image data encoding step of encoding the

separated image data in sequence from a lower to a higher frequency component thereof, thereby generating image encoded data;

the sound data encoding step of encoding the
5 separated sound data in sequence from a lower to a higher frequency component thereof, thereby generating sound encoded data; and

the frame encoded data generating step of
generating header information by using the image
10 encoded data and the sound encoded data, and generating frame encoded data by using the header information, the image encoded data, and the sound encoded data.

20. An encoding method of encoding frame data containing image data and sound data, comprising:

15 the separating step of separating the image data and the sound data contained in the frame data;

the image data encoding step of hierarchizing the image data into a plurality of types of image data and encoding the plurality of types of image data, thereby
20 generating image encoded data corresponding to a plurality of levels;

the sound data encoding step of hierarchizing the sound data into a plurality of types of sound data and encoding the plurality of types of sound data, thereby
25 generating sound encoded data corresponding to a plurality of levels; and

the frame encoded data generating step of

generating frame encoded data by using the image encoded data and the sound encoded data,

wherein the frame encoded data generating step generates the frame encoded data by forming a plurality of groups of different levels by grouping the image encoded data and sound encoded data belonging to the same level determined on the basis of a predetermined reference, and arranging the plurality of groups in descending order of significance level.

21. A program which, when executed by a computer, allows the computer to function as an encoding apparatus for encoding frame data containing image data and sound data, comprising:

a code of the separating step of separating the image data and the sound data contained in the frame data;

a code of the image data encoding step of encoding the separated image data in sequence from a lower to a higher frequency component thereof, thereby generating image encoded data;

a code of the sound data encoding step of encoding the separated sound data in sequence from a lower to a higher frequency component thereof, thereby generating sound encoded data; and

a code of the frame encoded data generating step of generating header information by using the image encoded data and the sound encoded data, and generating

frame encoded data by using the header information, the image encoded data, and the sound encoded data.

22. A program which, when executed by a computer, allows the computer to function as an encoding
5 apparatus for encoding frame data containing image data and sound data, comprising:

a code of the separating step of separating the image data and the sound data contained in the frame data;

10 a code of the image data encoding step of hierarchizing the image data into a plurality of types of image data and encoding the plurality of types of image data, thereby generating image encoded data corresponding to a plurality of levels;

15 a code of the sound data encoding step of hierarchizing the sound data into a plurality of types of sound data and encoding the plurality of types of sound data, thereby generating sound encoded data corresponding to a plurality of levels; and

20 a code of the frame encoded data generating step of generating frame encoded data by using the image encoded data and the sound encoded data,

wherein the frame encoded data generating step generates the frame encoded data by forming a plurality
25 of groups of different levels by grouping the image encoded data and sound encoded data belonging to the same level determined on the basis of a predetermined

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reference, and arranging the plurality of groups in descending order of significance level.

23. A recording medium recording the program according to claim 21.

- 5 24. A recording medium recording the program according to claim 22.

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